

## On-line characterization of single bubbles in multiphase reactors

<sup>1,2</sup>A. Ferreira, <sup>2</sup>F. Rocha, <sup>1</sup>J. A. Teixeira

<sup>1</sup>IBB-Institute for Biotechnology and Bioengineering, Centre for Biological Engineering, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal; <sup>2</sup>Departamento de Engenharia Química, Faculdade de Engenharia, Universidade do Porto, Rua Dr. Roberto Frias s/n, 4200-465 Porto, Portugal

This paper presents an on-line method to identify automatically the single bubbles (isolated bubbles without influence of surrounded bubbles) in multiphase reactors. Based on image analysis technique (IA), the method combines the information given by IA with the Discriminant factorial analysis leading to results that allow the identification of single bubbles and the study of bubble population complexity. By this way, it is possible to characterize the single bubbles on different conditions and to understand their influence on mass transfer. Agreement between automated and manual classification, measured in terms of a performance index, is 90% on average. Further, it describes the application of such methodology to the study of the influence of bubble characteristics (size, shape, bubble population complexity, etc) on the individual parameters of volumetric liquid side mass transfer coefficient,  $k_La$ . The experiments were done at different temperatures (25-35°C) and superficial gas velocities (up to 14 mm/s) in a bubble column.